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ABSTRACT

Mental models or implicit theories held by adults about everyday problem solving were studied. Research questions were posed to 12 male and 12 female adults, aged 25 to 60 years, from a wide range of educational and occupational orientations. Subjects were interviewed in pairs. Verbal Protocol Analysis was used to analyze the data from two distinct vantages: first through a content analysis of specific responses to the interview questions, and then through the frequency of responses obtained from the application of a coding grid developed for the study. A generic model was derived and applied to recuperate and elaborate the emerging mental models. The integrated framework on induction proposed by J. H. Holland and others (1986) was adopted as a conceptual framework for the study by virtue of its use for ill-defined problems and its application to social science research. Results identify the predominance of the interpersonal and emotional factors salient to this genre of problem solving. Individual differences, communication, and problem identification are highlighted as the most significant and difficult areas on which success was contingent. Degrees of self-confidence and habitual usage of a system of method were seen to be significant factors, often correlated with experience and education. Two tables and two figures illustrate the study. (Author/SLD)

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IMPLICIT THEORIES ABOUT EVERYDAY PROBLEM SOLVING

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ABSTRACT

The present study was designed to elicit the mental models or implicit theories held by adults about everyday problem solving. Research questions were posed to twenty-four adults, age 25-60, from a wide range of educational and occupational orientations, were interviewed in pairs. Verbal Protocol Analysis was used to analyse the data from two distinct vantages; firstly, through a content analysis of the specific responses to the interview questions, and secondly, through the frequency of responses obtained from the application of a coding grid developed for the purposes of the study. A generic model was derived and applied to recuperate and elaborate the emerging mental models.The integrated framework on Induction proposed by Holland, Holyoak, Nisbett, and Thagard (1986) was adopted as a conceptual framework for the study, by virtue of its use for ill-defined problems and its application to social science research.

The results identified the predominance of the interpersonal and emotional factors salient to this genre of problem solving. Individual differences, communication and problem identification were highlighted as the most significant and difficult areas upon which success was contingent. Degrees of self-confidence and habitual usage of a system or method were seen to be significant factors, often correlated with experience and education.

INTRODUCTION

It is a commonly accepted notion that individuals bring a set of knowledge, beliefs, attitudes, and abilities to the problems they encounter, which predisposes the manner in which they will respond. Often these subjective elements lead the solver to choose idiosyncratic and unpredictable alternatives in resolving problems. Current research has given enhanced credibility to these subjective elements, providing a major interdisciplinary connector between paradigms and precepts about learning and learners.

RESEARCH OBJECTIVES

The present study was conducted to identify and explore the mental models or implicit theories held by such adults about the everyday problem solving processes of self and others. Parameters were drawn from these implicit theories and analysed for the purposes of gaining insight into the form and content of these mental models. These objectives were operationalized through the following queries:

1. Do adults consciously think about their problem solving processes?
2. How aware are they of these processes?
3. What do adults feel are the salient variables facing themselves and others in their everyday lives as they solve their dilemmas?
4. What are the common parameters of these implicit theories?

FOCUSED REVIEW OF THE LITERATURE

The literature on problem solving is extensive. For the purposes of the present research, a review of the literature is focused on that pertaining to everyday problem solving, and the approaches of researchers in their quest to unravel and reveal laypersons' implicit theories pertaining to the processes involved. Throughout the ensuing discussion, the terms 'implicit theories' and 'mental models' are used interchangeably.

Neisser emphasizes the contextual element of appropriate intellectual behavior. "Intelligent behavior in real settings often involves actions that satisfy a variety of motives at once - practical and interpersonal ones, for example - because opportunities to satisfy them appear simultaneously. It is often accompanied by emotions and feelings, which is appropriate in situations that involve other people..." (Neisser,1976,p.136).

Creative thought and problem solving are evident even in such seemingly mundane situations as making tea (Cavanaugh,1985 p.147). Adults make decisions daily on the basis of what they believe, how they feel, their level of motivation, their insight into their own knowledge base and the operative situational variables. Much of the considerable body of research by Pressley (1989) and his colleagues is predicated on the assumption that individuals hold general beliefs about the factors which affect their performance and determine their own competence. Cornelius & Caspi (1987) found

that the adults sampled did share similar views of effective and ineffective solutions to the practical problems presented, irrespective of formal training in psychology, age, or gender. They found that performance on the Everyday Problem-Solving Inventory, constructed for the purposes of the study, traditional verbal ability measures (Thurstone Verbal Ability Test and Blieszner, Willis, & Baltes Letter Series Test) increased with age and that the level of education was unrelated to everyday problem solving ability.

Alexander & Langer (1990) contend that cognitive growth in adults is particular and conditional depending upon the pragmatics and context of their lives. Adults bring a particular predisposition to the learning situation which differs qualitatively from children. The prior knowledge, experience, habitual responses, broader life context, differing motivational and attributional orientations, history of success or failure, personality, stress, social and cognitive factors, locus-of-control, fear-of-failure etc. which they bring to the problem space can all result in endlessly confounding variables within the learning context. In addition, Holyoak (1990) suggests that the motivational factor of concern for the future is fundamental to the goal formation and maintenance necessary for successful problem solving. This concern for the future is evident to a much greater degree within the adult population. Not only do

maturational factors influence the adult, as distinct from the child, but the application of the cognitive processes differ qualitatively. Adult problem solving is often more purpose generated than that of a younger person. Their emotional and practical committment to the outcome may be far greater. Clancey (1987) confirms that problem activity is constrained by a social-context and that the problems themselves must explain and predict events in the world for the purpose of planning higher-goal attainment.

The effective management of information and resources necessary for the achievement of a targeted goal is enabled by a group of abilities referred to as metacognition. These processes involve the predicting, checking, monitoring, reality testing, coordination and control of deliberate attempts to learn or solve problems.

Metacognitive knowledge is essentially knowledge or beliefs about what factors or variables act or interact in such fashions as to affect the course and outcome of cognitive endeavors (Flavell,1979). These variables involve those of person, task and their interactions. Whether intentionally or unintentionally activated, metacognitive knowledge has an influence on cognitive processes in problem solving without it necessarily entering consciousness. Once it has done so then it becomes a metacognitive experience (Flavell,1979). It is the challenge of the present

research to attempt to uncover and illuminate the findings of such complex thought processes about which the participants may have little conscious awareness.

This renewed interest in the informal problem solving which constitutes the bulk of adult's experience has become a distinct area of research in the cognitive sciences. This domain of everyday problem solving necessitates research outside the scope of formal education and what little has been done is focused on the adult population almost exclusively. Many solutions to problems in everyday life are chosen on the basis of emotions,values, beliefs, insights, 'feelings-of-knowing', or may even be merely impulsive responses rather than predictable, logical progressions through identifiable stages. Heuristics known, and indeed often applied by the individual, may be thrown aside at any time in favor of these subjective elements. These factors complicate the problem solving process in real life and are undeniable confounding variables in the research.

In his study of practical or everyday intelligence, Sternberg, Conway, Kreton, & Bernstein, 1981) delineates the differences between the problems people face in real life contexts and the types of problems which are posed in critical thinking programs. Sternberg's findings support the view that people have definitive opinions of what constitutes a person with practical problem solving ability. People were observed to have well-

established implicit theories on intelligence, including problem solving, which were compatible with those of experts in the field.

It is surprising that research into the solving of everyday problems with adult populations is so sparse. What has been done generally falls into areas of gerontology (Williams,Wadsworth, Denney, & Schadler, 1983; Cavanaugh, Kramer, Sinnott, Camp, & Markley, 1985), memory (Hultsch, Dixon, & Hertzog, 1985), general intelligence (Sternberg et al., 1981; Sternberg, 1985; Cornelius & Caspi, 1987), or mathematics (Schoenfeld, 1985).

CONCEPTUAL FRAMEWORK

The most fitting framework for the present research should make the type of information sought more transparent and match the epistemology of the desired information. Contrary to the class of well-defined problems often found in the literature, the genre of problems facing daily living are invariably ill-defined. The extent to which a problem is ill-defined is contingent upon the knowledge of the problem solver (Holyoak,1984). Problems are considered ill-defined when the representations of one of the more basic components (the goal, the initial state,operators,and constraints) are incomplete (Holyoak,1990). Herbert Simon (1978) suggests that with ill-structured problems, the criterion for goal attainment is more complex and less evident. Hayes (1981)

distinguishes an ill-defined problem as one requiring the solver to contribute to the definition of the problem from his/ her own repertoire of resources. As the information necessary to solve the problem is not fully contained within the problem space, there are no simple paths for solution. Action must be taken within an atmosphere of uncertainty.

The unified framework of Induction offered by Holland, Holyoak,Nisbett, and Thagard (1986) outlines an integrative, inductive approach to problem solving.Their approach has been adopted by virtue of its use with both sciences and social sciences, and its suitability for ill-defined problems.Integral to this framework is the notion that exceptions and variabilities are a constant in human experience.

Induction refers to "all inferential processes that expand knowledge in the face of uncertainty" (Holland et al,p.1). Induction then, is the study of how knowledge is modified through its use. Individuals formulate categories as they generate goal-relevant inferences. The relevance and validity of what the learner brings to the problem environment will either enhance or retard this inductive process. The use of declarative knowledge (required factual information),procedural knowledge ('how' to perform the task or implement the solution) (Anderson,1990), and conditional knowledge ('when' to apply which procedure) (Marzano, 1987),are foundational to this framework, thus accommodating all

of thought processing, collecting and analysing information and forming conclusions.

Holyoak (1984) specifies that the activity of problem finding, defining, and refining resurrects old knowledge in such a way as to generate new possibilities, via the construction of mental models. Such models are a psychological representation of a given environment and its expected behavior. This mental model is then used to predict the results of possible changes in the external environment. Depending upon the nature of the problem and the problem-solver, model construction may be through morphisms, homomorphisms, isomorphisms, analogies, metaphors, and schemas. Induction then, is the process whereby mental models are generated and the components of which are revised. Mental models or implicit theories already exist in peoples' minds (Sternberg et al., 1981). They require that the researcher discover them, by eliciting the form and content through a sensitive and flexible methodology.

METHODOLOGY

The type of information desired is that of metacognitive knowledge which is challenging to capture, particularly with individuals who are unaccustomed to thinking or describing themselves in this way. The objectives of the research required a two-fold research design. A preliminary pilot study was conducted

to establish a suitable interview format which would be broad enough to allow the participants adequate amplitude and personal comfort to express themselves in their own ways, while focused enough to draw out their implicit theories.

Sample

Twenty-four individuals were interviewed for the average duration of forty-five minutes. Volunteers, age twenty-five to sixty, were paired due to the findings of the researcher (Herbert, 1992) and others (e.g. Schoenfeld, 1985) that the use of pairs allows time for reflection on the part of each person, often leading to embellishment, rebuttal, or clarification of their views. Pairs seemed to be more relaxed and less intimidated by the interview process. It can be argued that the interaction stimulates greater verbalization. Perhaps most significant for the purposes of this particular study, the pairs interaction is likely to facilitate fuller discussion at the abstract level rather than the tendency for a single subject to become bound in discussion of specific problems.

Participants showed interest in the subject matter but little formal familiarity with problem solving as a discipline. The lower limit of twenty-five was set to insure the participants were old enough to have had some experience with the types of problems in question. The upper limit was established to reduce the possibility of confounding gerontological factors which may be

particular to post-sixty adults.

Participants consisted of twelve male and twelve female volunteers, contacted through public notice, word of mouth, or invitation. Some individuals were solicited by virtue of complementary age, education, or occupational level to ensure that a variety of each was included. The method of selection produced a purposive sample which was deemed more appropriate than random selection by virtue of the need to reflect a potentially large variety of responses.

Interview

An initial preamble to the interview consisted of introductions, a sharing of a few biographical details to foster rapport, and a general discussion of the work undertaken by the researcher to stimulate interest. It was evident during the pilot study that it is essential to make explicit that the focus was on the processes of problem solving rather than on individual problems of the participants. Likewise, it was observed that the individuals needed to understand that the domain of problems to be discussed was that of 'everyday' problems, lest they focus too specifically on work or technical problems, including stereotypical ideas that problem solving was a logistical or mathematical exercise.

Individuals were encouraged to be informal and conversational

in their dialogue. Care was taken to establish an atmosphere of congeniality and acceptance, to encourage the participants to speak freely about their views. An initial preamble was constructed by the researcher to frame the context and help the participants to focus their responses. Questions were then posed to draw forth the required information. Each interview was audio-recorded continually from the initial question.

It is important to reiterate the diversity among the participants in regard to their personal experience with everyday problem solving. Some of these adults have survived extremely challenging and often debilitating childhoods. Several individuals were younger and had not the extent of personal responsibilities and difficulties of those older participants. The contrast is evident in the lives of three younger adults who have yet to face personal crisis, the taxing burdens of home ownership or financial committment, when compared with others who are in extreme financial or professional difficulty or one mother who watched her five year old daughter killed before her eyes in a freak accident. It is apparent from reading the protocols that there is a great variance in psychological insight and self-awareness. These elements are certainly not contingent upon age but rather personal disposition and many other subjective variables. Often the dialogue was touching, as they shared many vulnerabilities; degrees of personal self-confidence,

interpersonal conflict,and histories of success or lack of same in handling these dilemmas. The very nature of everyday problem solving is personal. The skills and approaches utilized by each individual are fundamental to our outlook on life and are derivative of the sum total of our experiences and learning.

In light of the research objectives, Verbal Protocol Analysis was used as an effective methodology (Schoenfeld, 1985; Rowe, 1985; Williams, Wadsworth, Denney, & Schadler, 1983). Ericsson and Simon (1984) suggest verbal reports as a rich source of data for the study of cognitive processes, capable of providing indices to infer mental representations. They argue that the process of verbalization does not interfere or inhibit these thought processes, under certain conditions.

Analysis

The selected methodology necessitated the verbatim transcription of the interviews. The content was broken into episodes thought to reflect a common theme or idea intended by the interviewee. Responses were grouped into categories by virtue of content comparison. A coding grid was established, on the basis o these categories, to provide a vocabulary with which to describe this content and to identify common parameters among the mental models of the participants. A second level of analysis was added to directly address the research questions. This allows the participants maximum amplitude to speak for themselves, in their

own ways. The complementary nature of these two levels of analysis was intended to render the depth and content of the participants' awareness about everyday problem solving as transparent as possible, from the level of pragmatic strategy usage to the more abstract metacognitive knowledge.

Due to the highly abstract and broad nature of the material obtained, the most significant difficulty in this exercise was the inevitable interdependence of the variables brought forth in the discussions. It was not the purpose of the present study to develop a taxonomy but rather to identify a collection of categories, referred to as the coding grid, derived inductively from the content of the protocols themselves, expressed in the vernacular of the dialogues wherever possible. It is the nature of such discussions that one participant may omit expressing an opinion, feeling that it may be redundant to the comment of the other. This effect is minimized by reporting the results in pairs, using each protocol as a singular unit of analysis.

The coding grid consists of seven reference categories pertaining to problems and problem solving in general in relation to: people, talking and feeling, education and experience, orientation, use of a method or system, and process. Table 1 describes the coding grid by reference category, frequency of protocols, and by examples of these comments. Each reference category has been broken down into subcategories which act as

descriptors of the comments made by the participants.

Insert Table 1 about here

RESULTS AND INTERPRETATION

The analysis of this genre of information is a challenge to present the material in fairness with its nuance and richness, while identifying pertinent groupings and commonalities. Every effort has been made to retain the vernacular employed by the respondents.

Content Analysis

The research objectives were addressed through a content analysis of the specific responses to the interview questions. This was done in two ways; firstly describing the frequencies of protocols in which statements of categories and subcategories were found, and secondly, the frequency and relative frequency of statements corresponding to the reference categories. The frequency responses allow the pairs to speak as one voice.

The coding grid used for the purposes of this discussion (see Table 1), displays the reference categories. the frequency of protocols mentioning these statements are supplemented by direct quote examples, followed by a subsequent notation indicating the protocol number and the line number of the text in question (e.g.

"depending what the problem is..." [3:66]). It should be noted that in each case 12 reflects the maximum number of responses possible. All protocols referred to the ideas that people problems are idiosyncratic, more significant, or more difficult. All protocols mentioned that communicating is difficult and important, and that emotions and attitudes are pivotal. Each pair described problem solving as requiring time, effort, committment, personal insight, or openness. They were also unanimous in bringing up the processes of problem breakdown, exploration, and analysis.

The categorizing and sorting of all episodes permits the groupings shown in Table 2. The frequency of occurrence of each category is recorded as well as the percentage this assumes of the total number of episodes. As observed in Table 2, the categories of talking and feeling, orientation, and process are referred to almost twice as much as all other categories.

Insert Table 2 about here

The narrative provides an excellent complement to the frequency description. Although complementary, the mention of frequency to follow is a separate grouping for the purpose of more general comment by the subjects. The essence of these comments is often predicated by such indicators as: "I think the most important thing is...", "this is really the key" and such. The extraction of these experts may require more insight on the part

of the researcher to ferret out the essence of each participant, but this can almost invariably be justified by the quotes themselves.

The respondents made a clear distinction between the types of problems they encounter in their work environments, practical or technical problems, and everyday problems (7 protocols out of 12). They identified that the two former types are distinct in their more well-defined natures and the resources available to enhance solution. their concern lay with the latter genre of problem. They felt that the everyday problems were ill-defined, more difficult (4 protocols), and invariably involved other people (12 protocols). Although these problems are defined as more significant, participants said they rarely thought about the process involved and tended not to use any method (9 protocols), unlike the work and practical problems. The self-professed *modus operandi* of most of the respondents were procrastination, denial, and avoidance (6 protocols). Many live in the hopes that their problems will go away, if ignored. Their propensity was to use instinct, intuition, or emotional orientation to solve these problems. They suggested that many of the problems themselves originated in childhood experiences, as did their habitual ways of solving them (9 protocols). Many suggested that without motivation. problems usually remained unresolved (7 protocols). To generalize, the individuals felt that an important element was

realizing that a problem did in fact exist. Once acknowledged, the primary difficulty lay in the identification of the problem, and its source (9 protocols). The participants were of accord that in the issue of problem identification, the emotional element was the most confounding variable, often leading to confusion, distraction, and further complication. They found that if problems were not resolved on an ongoing basis, they had a tendency to become compounded and convoluted. Each pair mentioned with emphasis that individual differences were a constant and that the processes of attack and resolution were highly idiosyncratic. It was often mentioned that people have a tendency to become encapsulated within a certain view or 'tunnel vision' which was a seriously limiting factor in the resolution process (5 protocols). This rigidity was thought to limit one's ability to recognize a problem, or fully explore alternatives.

Once a problem was identified, it was important to take the time necessary to solve it. Many verbalized a process of identification, analysis, exploration, implementation, and reflection. Although many seemed familiar with this structure, few actually used it. Their tendency was much more *ad hoc* and instinctual.

The most pronounced elements of interest and concern to these respondents lie in the interpersonal and communication requirements of everyday problem solving. They felt that the

skills of talking and listening surrounding these problems were the most significant determinants of success, to the point of saying that when communication is inadequate a solution cannot be reached. There was a great need to talk about the problems with others, to receive support, reassurance, and input.

The emphasis rested on the extreme difficulty intrinsic to the emotional component of everyday problems and the arduous, often impossible task of separating out the emotional factors to gain objective perspective. Most found the emotions of stress, confusion, insecurity, and anxiety to be debilitating in the problem resolution process. Those who were able to remain clam and attain some degree of objectivity or perspective felt more confident to work through the problem. Those who began by simplifying the problem as much as possible seemed noticeably more effective as problem solvers. Proficiency at everyday problem solving was highly correlated to personal confidence, which itself was often contingent upon past experience and education.

Mental Models

Having categorized the content of the protocols into descriptive components of adults' mental models of everyday problem solving, it is then possible to use these elements for the construction of the implicit theory in question (see Figure 1).

Insert Figure 1 about here

The generic model categories and subcategories found in the grid are described pictorially to represent components of a mental model. Selected representative statements have been 'lifted' from two protocols as exemplars of how a mental model may be recuperated from the data. The activity of building up these scenarios allows the implicit theory to be rendered explicit. The first example, protocol two (see Figure 2), is information garnered rom an interview with a thirty-six year old engineer. Her family was devastated two years ago by the death of their three year old daughter of a brain tumour. She has been a full-time mother for eight years and has two young children remaining. She was paired with a thirty-four year old single gentleman, who has a degree in Business Administration, currently working as a tax analyst. He suffers from a congenital deformity, leaving him with pincher hands and numerous other physical deformities.

Insert Figure 2 about here

The mental model from these two individuals describes interpersonal problems as the most difficult and the most important. The inevitable emotional factors take a lot of energy to deal with and people need help learning to discuss their problems and the related stresses to disenfranchise themselves from these emotional components. It is important to generate

and choose the best alternatives for solution. Although they rarely think about the process, maintaining a faith that resolution will come in time, they believe learning comes with experience and social interactions. The second example, (see Figure 3) protocol twelve, was taken from an interview between two forty-eight year old men. One participant is a real estate agent with a master's degree in science, the father of two children. The other has a grade twelve education, is the father of several children, and makes a living as a manager of an arts supply business and owner/ operator of an antique business.

Insert Figure 3 about here

The mental model expressed by this protocol again mentions the lack of an explicit method or system for problem solving. They believe that problem solving is continual and usually requires consensus from others for resolution. The ability to divorce oneself from the emotional issues is seen as important and difficult. As people tend to loose their focus and goal orientation, they need to gain perspective and priorize to hone in on the key issues. Education is believed to facilitate good problem solving.

SUMMARY

A significant contribution of the present study rests on its utility as a vehicle through which the participating adults could

express the fundamentally 'human' dimensions intrinsic to everyday problem solving. The interviewees took personal risks in their self-disclosures, which facilitated meaningful introspection and produced data from which to understand their mental models. These narratives evidenced that each individual has several themes around which his/her ideas revolve. These nuclei seem to be the barometers upon which the subjects viewed themselves and others as problem solvers. Having rarely discussed this issue, participants had to struggle for vocabulary and content. The natural tendency seems to adhere more to the mundane level of problem specificity.

One of the most interesting elements of the findings lies in the omissions; the metacognitive awareness about everyday problem solving is clearly lacking. This is evident in the nature of the remarks made by the participants as well as a self-professed limited understanding and conscious perception about how they administer these problem solving processes, despite their importance as determinants to personal success and happiness. A case in point may be made on the basis that little self-monitoring was done during the interviews themselves.

The study establishes the existence of mental models held by adults about everyday problem solving. It also demonstrates the feasibility of the recuperation and elaboration of these implicit theories from the data obtained. For many, these models are disjointed, fragile, and lacking in metacognitive perception. time

and again, these individuals remarked on how difficult it is for them to stand back from their problems and emotional entanglements to clearly identify the source. Some participants displayed what Brown (1978) classifies as 'secondary ignorance'. This may involve a lack of metacomprehension or lack of understanding of what one does not know, or a lack of knowledge inference about what is possible to determine and what isn't. Unfortunately, the failure to acquire enriched metacognitive knowledge is to some extent the result of self-defeating beliefs (Borkowski Carr, & Pressley, 1987). This lack of confidence is a touching element throughout the confessions made by most of the respondents. Another relevant omission lies in the sparse reference to a personal philosophical, religious, or similar theoretical orientation, which often on a metacognitive level are the conceptual abstractions which direct solutions.

The individuals canvassed had little interest in the formal aspects of problem solving. their quandaries and expressed needs were decisively within the subjective realm of problem solving. Very few of the twenty-four adults interviewed said that they had given much thought to the problem solving process in general or to the specific ways in which they go about it in their personal lives. Sixty-four percent of these individuals attested to using no method in their solving but relying on intuition or strictly ad hoc responses, contingent upon the situational variables and moods

prevailing.

It goes without saying that there is an explosion of research and instructional material on the development of cognitive processes. The past decade has identified problem solving as an important domain for study. The processes involved are deemed a basic life skill essential to productive living. People are evaluated continually by themselves and others on their ability to be effective at problem solving in individual, intra-group and inter-group contexts. Problem solving has become a clearly established goal of contemporary education. Sternberg (1985) reports that our modern western culture defines problem solving as one of the three streams of intellectual activity.

In an effort to service the educational needs of the adult population, it behooves the educator to get in touch with how people view their problem solving and what they, in fact, would like assistance with. It is novel to the research in problem solving to ascertain and utilize the substantial body of experience and metacognitive awareness of the adult learner in this way. It is our contention that the problem solving profiles of adults which emerged from the interviews should be considered.

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Table 1

Coding Grid of Reference Categories and Subcategories

Reference Category/ Subcategory	Frequency of Protocols	Example
People & Problem Solving		
1)problem solving is chronic &/or difficult	8	I have a really hard time solving my own problems (8:122)
2)problem solving is contextual &/or variable	10	I probably have a techniques for problem solving.... they vary depending on the situation (1,29-32)
People		
1)people problems are idiosyncratic, more significant, or more difficult	12	People problems are the tough ones (1:83-84)
2)people need help with problem solving	10	they don't know where to start...helping them (6:182-183)
3)people are encapsulated	5	their biases get in the way (1:56)
Talking & Feeling		
1)communicating is difficult & important	12	You have to take the time to talk (1:130)
2)support from others is important	9	I seek outside advice (3:106)
3)emotions & attitude are pivotal	12	you try to keep anxiety to a minimum (7:301)

to be continued ...

Table 2
cont'd

Parameter: Reference Category	Frequency of Protocols	Example
Education & Experience		
1)childhood experiences are salient	9	Growing up has a lot to do with the problems you have (4:189-190)
2)previous education & experience are significant factors	9	I've learned through experience (2:427)
Orientation		
1)it is important to simplify, gain perspective & emotional distance	10	that ability to stand back and see yourself in the third person (10:154)
2)problem solving requires time, effort, committment, personal insight, or openness	12	they become committed and your problem is solved (1:77-78)
3)assigning appropriate significance, responsibility, priority,& goals is crucial	11	to identify problems worth solving (2:558)
Use of a System or Method		
1) valuing the use of a method	10	maybe there is a way of doing it (12:244)
2) proceeding ad hoc or by instinct or intuition	9	look to your intuition (9:376)

to be continued...

Table 2

cont'd

Parameter: Reference Category	Frequency of Protocols	Example
Process		
1) problem acknowledgment & identification is important	11	identify the problem then they can solve it (4:73)
2) problem confrontation	9	you sort of have to attack it (8:13)
3) problem breakdown,exploration, & analysis	12	you should look at all the angles (8:56)
4) problem prevention & anticipation	4	the consequences of his actions (9:195)

Table 2

Frequency of Episodes Classified by Reference Category

Reference Category	N	%
problem and problem solving in general	37	7.4%
people	64	12.7%
talking and feeling	115	22.8%
education and experience	45	8.9%
orientation	107	21.3%
use of a method or system	27	5.4%
process	108	21.5%
total	503	100%

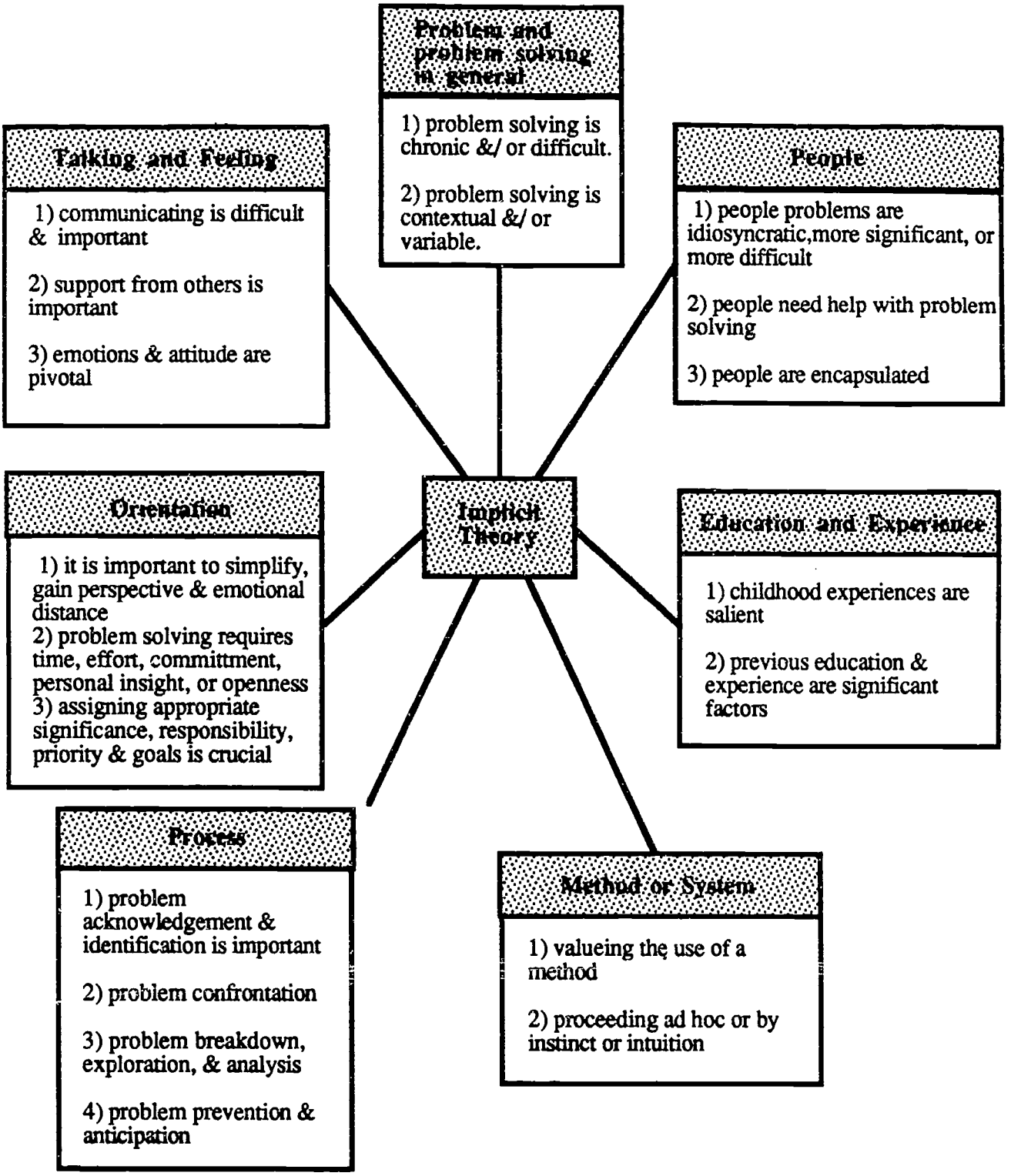

Figure 1. Generic Model Representing Implicit Theories

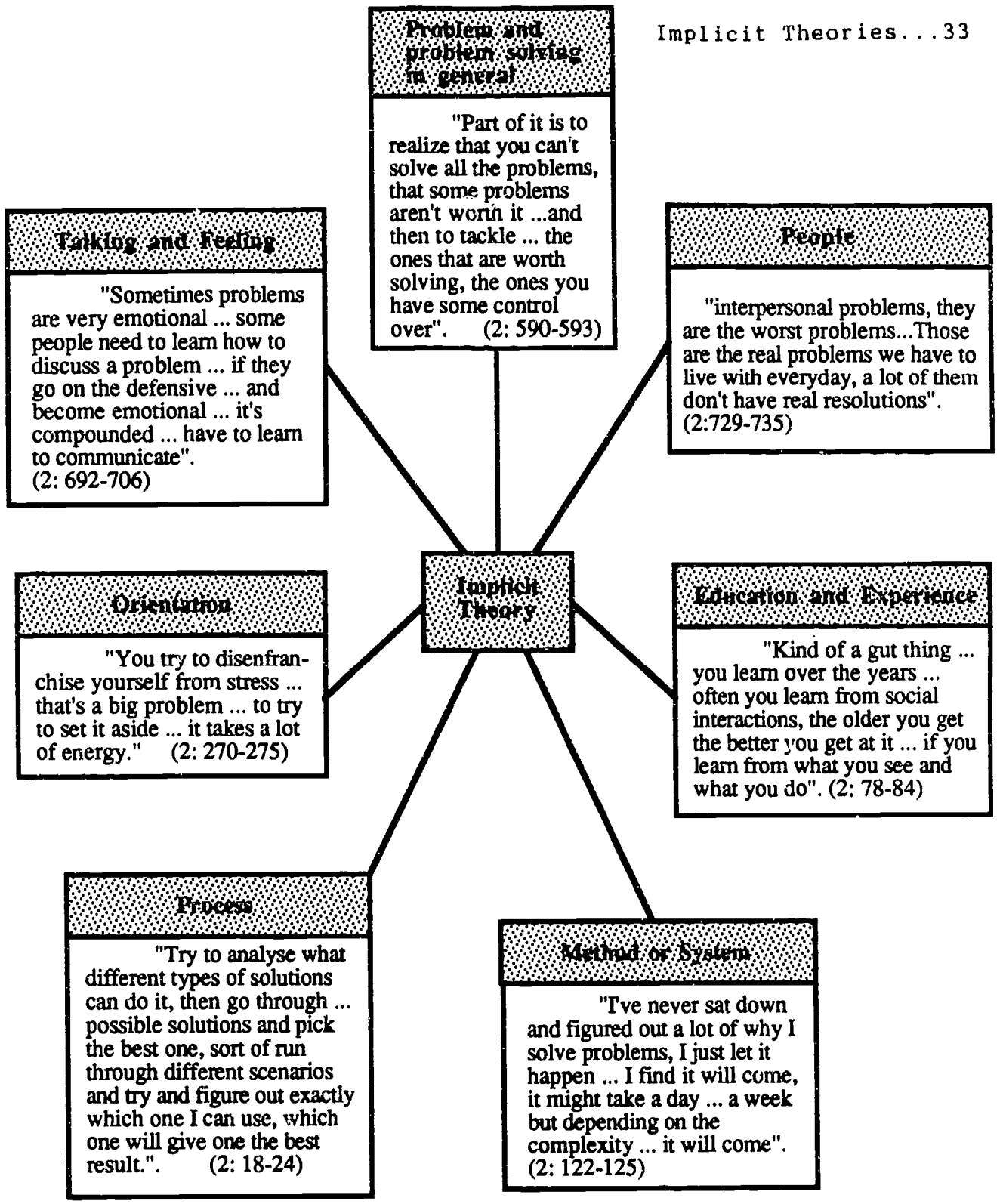

Figure 2. Implicit Theory Derived From Protocol Number 2

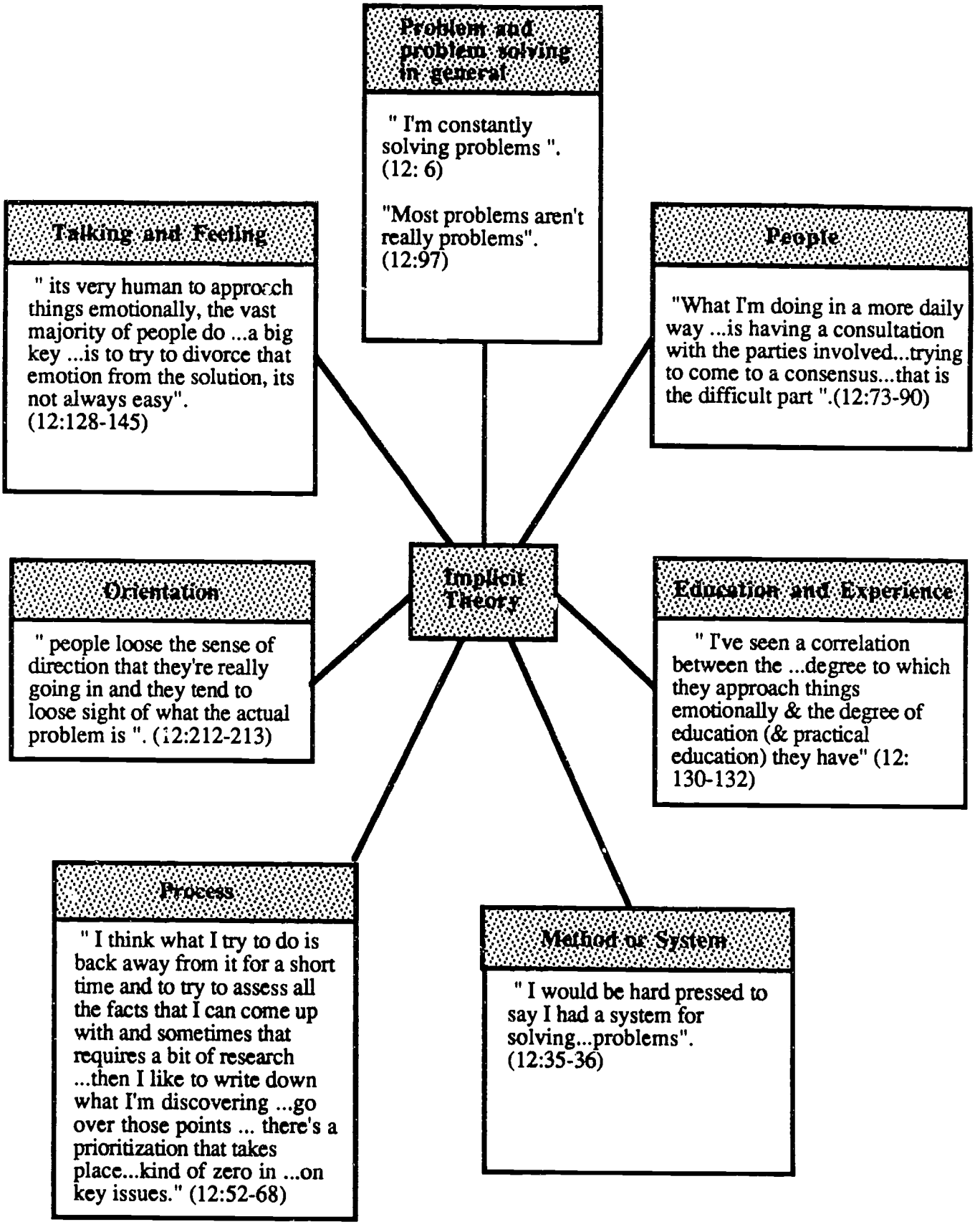

Figure 3. Implicit Theory Derived From Protocol Number 12